UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA
and
MONTANA AGRICULTURAL EXPERIMENT STATION
BOZEMAN, MONTANA
and
WYOMING AGRICULTURAL EXPERIMENT STATION
LARAMIE, WYOMING

NOTICE OF RELEASE OF FOOTHILLS GERMPLASM CANADA BLUEGRASS SELECTED CLASS OF GERMPLASM

The U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS)—Bridger Plant Materials Center and the Agricultural Experiment Stations of Montana and Wyoming announce the naming and release of a selected class *of* germplasm of Canada bluegrass (*Poa compressa* L.). This germplasm was evaluated and selected by the USDA/NRCS Plant Materials Center (PMC) at Bridger, Montana. This release is a composite of eight accessions (assigned accession number 9078666) and will be referred to as **Foothills** germplasm Canada bluegrass.

This germplasm is being released as a selected class release under the Pre-Varietal release procedure. There are only two other cultivars *of* Canada bluegrass available on the commercial market; 'Reubens', a private release by Jacklin Seed Co. Post Falls, ID and 'Talon' a private release by Seed Specialists, Hayden Lake, ID. The cultivar Canon was released in 1944 by the Ontario Agriculture College, University of Guelph, Guelph, Ontario, but no certified seed stock is commercially available.

ORIGIN INFORMATION: During the period 1980-84 thirty-seven (37) accessions *of* Canada bluegrass were received at the Bridger PMC from the National PMC-Beltsville. Those lots with enough seed to plant a 0.3 to 1.0 meter row **(13** accessions), along with eight Montana and Wyoming collections and the private released cultivar Reubens, were included in Initial Evaluation Plantings at the Bridger PMC and at the Montana Conservation Tree Seedling Nursery in Missoula, Montana. From the twenty-two accessions evaluated, eight superior ecotypes were selected to make up the new release germplasm. The actual origin information on these accessions is available as country of origin only.

Original Accession Number	Country *of* Origin
9010409	Denmark
9010410	Denmark
9011549	Romania
9012567	United States
9012568	United States
9014659	Netherlands
9018468	Czechoslovakia
9021278	USSR

DESCRIPTION: Canada bluegrass is a cool-season, low-growing, rhizomatous, perennial grass introduced from Eurasia. This species is often confused with Kentucky bluegrass, but has a distinct blue-green foliage, flattened wiry stems, and short, semi-compact panicles. There are few basal leaves, while culm leaves are short and erect. Unlike Kentucky bluegrass, Canada bluegrass does not form a tight sod and regrowth is relatively slow following clipping or grazing. The seeds have a strongly keeled lemma with sparse webbing at the base and slight pubescence toward the base of the keel and margin nerves. This species is considered apomictic; producing seed asexually (Stebbens 1941). This mode of reproduction is common in the high polyploides of the genus *Poa* [*Poa compressa* with a chromosome number of 2N=42 (Darlington and Janaki-Ammal 1945)]. **Foothills** germplasm Canada bluegrass has an average of 3,520,000 seeds/kilogram (1,600,000 seeds/lb.).

ADAPTED SITES AND RANGE: Although introduced, Canada bluegrass has naturalized throughout much of North America since its introduction into Canada (circa 1792). This species is most common throughout the northern tier of the United States and the southern tier of Canada. Canada bluegrass is considered a pioneer species, readily colonizing on disturbed soils. Although it does well on wet sites, it thrives on moderately acidic, droughty, and low-nutrient soils. This species can be found in open meadows, open deciduous and coniferous stands, and waste areas from Newfoundland to Alaska, south to Georgia, Tennessee, New Mexico, and California.

METHOD OF SELECTION: Small quantities of seed (trace to 2 grams) were received from the National Plant Materials Center-Beltsville, MD in 1980 (9 accessions), 1981 (17 accessions), 1982 (3 accessions), 1983 (2 accessions), and 1984 (6 accessions). Of these thirty seven accessions only 13 had enough available seed to attempt seeding in a field Initial Evaluation Planting. A 1982 seed collection trips in the mountains and foothills of western Montana and western Wyoming yielded an additional 8 accessions. The released cultivar Reubens was used as a standard of comparison.

Initial Evaluation Planting I-Bridger PMC A project was established to evaluate plants adapted for use on mined land reclamation and range renovation. On July 25, 1980, November 19, 1980 and March 10, 1981 short single rows (1 meter or portions of 1 meter) were seeded, as only limited seed was available. The Canada bluegrass accessions received in 1980 (9 accessions) and 1981 (only 4 with enough seed to plant), from the National PMC-Beltsville, and a Wyoming collection were included in this IEP (Table 1). Of the fourteen accessions planted, only eleven emerged and developed a stand. Seed harvest was initiated the second growing season to get enough seed to utilize this germplasm in larger evaluation plantings.

Table 1. Initial Evaluation Planting of grasses received for the National Plant Materials Center Beltsville, MD. and a collection from Wyoming. Established at the Bridger PMC.

Accession	Amount Seeded *Grams*	Emergence Date	Seedling Vigor	Stand Rating
Seeded 7/25/80				
9019181	2.0	8111/80	3	3
Seeded 11/19/80				
9012433	Trace	----	9	9
9011550	1.0	6120181	6	7
9011549	1.0	6120181	5	7
9010410	1.0	6120181	4	7
9010409	Trace	6/15/81	2	3
9012567	Trace	6120181	3	5
9012568	Trace	6120181	2	3
9014659	Trace	6120181	5	7
9018468	2.0	6120181	4	5
Seeded 3110181				
9018849	Trace	----	9	9
9029795	Trace	----	9	9
9020907	Trace	6/15/81	1	1
9021278	Trace	6115/81	3	3

Ratings 1-9, with 1 best and 9 dead.

Initial Seed Increase-Bridaer PMC In 1982 and 1983 seed was harvested from 11 accessions of Canada bluegrass that were being evaluated in an Initial Evaluation Planting at the Bridger PMC (Table 2). Because of the apomitic nature of this species the seed is a true genetic representation of the parent plants and there was no concern of cross-pollination with other accessions in close proximity.

Table 2. Seed Increase of Canada Bluegrass accession from Initial Evaluation Rows (Field 4) at the Bridger Plant Materials Center. 1982-83.

Accession	Source	Date Harvested		Amount Harvested	
		1982	1983	1982	1983
				grams	*grams*
T10409	Denmark	9/8	8/2	2.4	6.0
T10410	Denmark	9/8	8/2	2.8	12.0
T11549	Romania	9/8	8/2	2.7	9.0
T11550	Beltsville PMC	9/8	8/2	0.9	3.0
T12567	USA	9/7	8/2	0.3	7.0
T12568	**USA**	9/7	8/2	3.5	21.0
T14659	Netherlands	9/7	812	1.7	14.0
T18468	Czechoslovakia	917	812	3.4	27.0
T20907	Denmark	9/9	8/31	1.9	21.0
T21278	USSR	9/9	8/31	2.4	44.0
T19181	USA	7/12	-----	***30.0***	-----

Initial Evaluation Plantina-Missoula The Montana Conservation Seedling Nursery in Missoula, Montana provided land on which'to establish plots to evaluated grasses, forbs, and shrubs collected from or adapted to the mountains and foothills of Montana and Wyoming. The site was at an elevation of 975 meters (3,200 ft.) with annual precipitation of 350 mm (13.9 in). The frost-free season is between 105 and 120 days. As part of the Mountain and Foothills Initial Evaluation Planting 600+ accessions of 148 species of grasses, legumes, forbs, and shrubs were established at this western Montana site. On October 26, 1983 six accessions of Canada bluegrass were seeded in individual 5 meter long rows with 0.9 meter row spacing. These were accessions from the 1982 Montana/Wyoming seed collection trip (Table 3). On April 4, 1985 ten additional accessions were established utilizing seed increased at the Bridger PMC. These accessions were those received via the National PMC-Beltsville (Table **3).** The plots were evaluated yearly for 5-6 years for stand, vigor, forage production, ground cover, ability to spread, and seed production. The evaluation rows were mechanically cultivated between the rows and hand rogued within the rows. The accessions evaluated at the Missoula IEP was limited to those accession for which we had 3 grams or more of seed. Many of the accessions that had poor initial establishment spread by rhizomes and increased in vigor over the 5-6 years of evaluation.

Initial Evaluation Planting II-Bridger PMC As part of an Initial Evaluation Planting (established 4/28/88) of miscellaneous collections of grasses, forbs, and shrubs, fourteen accessions of Canada bluegrass were evaluated (Table 4). Of these fourteen, twelve of them had been previously evaluated in the Missoula IEP. The released cultivar 'Ruebens' was included as a standard of comparison. Each accession was seeded in individual 6 meter long rows, with 0.9 meter row spacing. The site was irrigated each growing season to maintain soil moisture near field capacity. Between row space was mechanically cultivated, while within row was hand rogued for off-types and sprayed for control of broadleaf weeds.

Table 3. Missoula Initial Evaluation Planting. Performance of Canada bluegrass accessions. Montana Conservation Tree Seedling Nursery.

Accession	1984 Stand	1984 Vigor	1985 Stand	1985 Vigor	1986 Stand	1986 Vigor	1987 Stand	1987 Vigor	1988 Stand	1988 Vigor	1989 Stand	1989 Vigor	1990 Stand	1990 Vigor
Seeded 10/26/83														
9019181	90	1	100	2	100	2	95	2	100	3				
9025922	85	2	100	2	100	2	80	2	80	3				
9025925	95	1	100	2	100	3	100	2	100	3				
9025926	90	3	100	2	100	2	100	1	100	2				
9025929	90	3	100	1	100	3	95	2	95	4				
9025960	80	4	95	2	100	2	100	1	100	2				
Seeded 4/5/85														
9010409			40	3	50	2	70	3	90	3	100	3	100	2
9010410			0	9	5	2	20	5	20	2	30	3	30	3
9011549			25	4	20	2	20	3	20	5	10	3	15	4
9011550			10	3	30	3	35	3	70	3	80	2	80	3
9012567			50	2	50	3	60	2	90	2	95	3	60	3
9012568			0	9	15	4	35	3	60	2	75	3	30	4
9014659			10	4	10	2	15	2	30	3	25	3	80	3
9018468			35	2	70	2	80	1	80	2	75	4	90	2
9020907			10	3	30	3	90	3	95	4	95	3	90	2
9021278			15	3	30	2	80	2	80	3	80	4	80	3

Vigor Ratings 1-9, with 1 best and 9 dead.

Table 4. Initial Evaluation Planting. Performance of Canada bluegrass grown at the Bridger PMC. Established 4/28/88

Accession	Stand 89	Stand 90	Stand 91	Stand 92	Vigor 89	Vigor 90	Vigor 91	Vigor 92	Forage Production 89	Forage Production 90	Forage Production 91	Forage Production 92	Ground Cover 89	Ground Cover 90	Ground Cover 91	Ground Cover 92	Seed Production 89	Seed Production 90	Seed Production 91	Seed Production 92
9010409	100	100	100	100	2	3	3	4	3	3	2	5	2	1	1	4	3	3	3	4
9010410	100	100	100	100	2	2	1	4	2	2	1	4	2	1	1	4	2	1	2	4
9011549	100	100	100	100	2	2	2	2	3	1	3	4	2	1	2	4	3	2	4	3
9011550	100	100	100	100	2	3	3	3	2	3	3	5	2	1	2	5	3	4	3	4
9012567	100	100	100	100	2	4	2	4	2	3	3	4	2	2	2	4	2	3	3	4
9012568	75	75	75	80	3	4	2	4	4	4	2	3	3	1	2	3	5	4	2	3
9014659	50	100	90	75	2	2	2	4	3	1	2	4	2	1	1	4	3	1	2	4
9018468	90	100	100	95	2	2	1	2	2	1	2	3	2	1	1	3	2	2	2	2
9020907	95	100	100	100	2	4	2	3	3	3	3	4	2	1	2	4	3	3	3	2
9021278	45	90	100	95	3	2	2	3	3	1	2	4	3	1	2	4	5	1	2	3
9025922	50	50			2	3			2	2			3	2			2	3		
9025925	70	100			2	3			2	2			3	2			4	3		
9025926	40	60	60	60	3	3	2	3	3	2	2	4	3	1	1	4	3	3	3	4
9025929	50	100			2	2			2	2			3	2			4	4		
9025960	75	100	100	95	2	3	2	3	3	3	3	4	3	2	2	4	3	4	2	4
9039222	0																			
Reubens	25	30	30	30	3	3	4	4	4	3	4	5	4	2	3	4	4	3	5	4

Rated 1-9 with 1 best

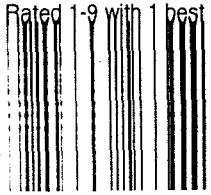

Table 3. Missoula Initial Evaluation Planting. Performance of Canada bluegrass accessions. Montana Conservation Tree Seedling Nursery.

Accession	1984 Stand	1984 Vigor	1985 Stand	1985 Vigor	1986 Stand	1986 Vigor	1987 Stand	1987 Vigor	1988 Stand	1988 Vigor	1989 Stand	1989 Vigor	1990 Stand	1990 Vigor
Seeded 10126183														
9019181	90	1	100	2	100	2	95	2	100	3				
9025922	85	2	100	2	100	2	80	2	80	3				
9025925	95	1	100	2	100	3	100	2	100	3				
9025926	90	3	100	2	100	2	100	1	100	2				
9025929	90	3	100	1	100	3	95	2	95	4				
9025960	80	4	95	2	100	2	100	1	100	2				
Seeded 4/5/85														
9010409			40	3	50	2	70	3	90	3	100	3	100	2
9010410			0	9	5	2	20	5	20	2	30	3	30	3
9011549			25	4	20	2	20	3	20	5	10	3	15	4
9011550			10	3	30	3	35	3	70	3	80	2	80	3
9012567			50	2	50	3	60	2	90	2	95	3	60	3
9012568			0	9	15	4	35	3	60	2	75	3	30	4
9014659			10	4	10	2	15	2	30	3	25	3	80	3
9018468			35	2	70	2	80	1	80	2	75	4	90	2
9020907			10	3	30	3	90	3	95	4	95	3	90	2
9021278			15	3	30	2	80	2	80	3	80	4	80	3

Vigor Ratings 1-9, with 1 best and 9 dead.

Table 4. Initial Evaluation Planting. Performance of Canada bluegrass grown at the Bridger PMC. Established 4/28/88

Accession	Stand 89	Stand 90	Stand 91	Stand 92	Vigor 89	Vigor 90	Vigor a	Vigor 92	Foraae Production 89	Foraae Production 90	Foraae Production 91	Foraae Production 92	Ground Cover 89	Ground Cover 90	Ground Cover 91	Ground Cover 92	Seed Production 89	Seed Production 90	Seed Production 91	Seed Production 92
9010409	100	100	100	100	2	3	3	4	3	3	2	5	2	1	1	4	3	3	3	4
9010410	100	100	100	100	2	2	1	4	2	2	1	4	2	1	1	4	2	1	2	4
9011549	100	100	100	100	2	2	2	2	3	1	3	4	2	1	2	4	3	2	4	3
9011550	100	100	100	100	2	3	3	3	2	3	3	5	2	1	2	5	3	4	3	4
9012567	100	100	100	100	2	4	2	4	2	3	3	4	2	2	2	4	2	3	3	4
9012568	75	75	75	80	3	4	2	4	4	4	2	3	3	1	2	3	5	4	2	3
9014659	50	100	90	75	2	2	2	4	3	1	2	4	2	1	1	4	3	1	2	4
9018468	90	100	100	95	2	2	1	2	2	1	2	3	2	1	1	3	2	2	2	2
9020907	95	100	100	100	2	4	2	3	3	3	3	4	2	1	2	4	3	3	3	2
9021278	45	90	100	95	3	2	2	3	3	1	2	4	3	1	2	4	5	1	2	3
9025922	50	50			2	3			2	2			3	2			2	3		
9025925	70	100			2	3			2	2			3	2			4	3		
9025926	40	60	60	60	3	3	2	3	3	2	2	4	3	1	1	4	3	3	3	4
9025929	50	100			2	2			2	2			3	2			4	4		
9025960	75	100	100	95	2	3	2	3	3	3	3	4	3	2	2	4	3	4	2	4
9039222	0																			
Reubens	25	30	30	30	3	3	4	4	4	3	4	5	4	2	3	4	4	3	5	4

Rated 1-9 with 1 best

Seed Increase of Superior Accessions After 5-8 years of evaluation of the Missoula IEP, superior accessions of several species were identified. Clonal material was dug up of each of these superior accessions and transplanted back to the Bridger PMC on May 16, 1991. Seed was harvested from plants that survived the transplanting (5 to 20 plants of each accession) (Table 5.).

Table **5.** Seed Increase of Superior Canada bluegrass accessions at the Bridger PMC.

Seed Collected from 1988 IEP Rows (7/30/92)		Seed Collected from Missoula Transplants (7/27/92)	
9010410	24 grams	**9010409**	177 grams
9011549	15	**9012567**	22
9014659	25	**9012568**	76
9018468	29	Native Collection-(8/18/87)	
9021278	32	9054634	580 grams

Comparative Evaluation Planting-Bridger PMC: On April 4, 1993, the nine superior accessions of Canada bluegrass and the released cultivar Reubens were established in a Randomized Complete Block design at the Bridger PMC. Each accession was seeded in replicated (3 reps) four-row plots with 6-meter long rows and 0.3 meter row spacing. The plots received two sprinkle irrigations in both 1993 and 1994. The plots were evaluated for stand and vigor on June 29, 1993 and forage was clipped with a flail-type forage harvester on July 30,1993; June 14,1994; June 2,1995; and July 31,1996.

Table *6.* Comparative Evaluation Planting—Canada bluegrass. Bridger PMC 1993-1996

	1993	1993	Forage Production				
Accession	Stand	Vigor	1993	1994	1995	1996	Ave.
	%		kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
9018468	90	1.3*	1288 ab	2809 ab	1300 a	562 a	1489 a+
9010409	93	1.0	1611 a	2466 abc	1363 a	510 a	1488 a
9012568	80	2.0	942 bcd	2495 abc	1274 a	695 a	1352 ab
9014659	68	3.0	620 def	3022 a	1235 a	492 a	1342 ab
9011549	70	3.7	716 cde	2554 ab	1185 a	571 a	1257 ab
9012567	87	2.0	1082 bc	2088 abc	1335 a	474 a	1245 ab
9010410	88	2.0	1259 ab	2127 abc	1003 a	565 a	1239 ab
9021278	73	3.3	453 efg	2005 abc	1066 a	500 a	1006 bc
9054634	33	4.7	223 g	1702 bc	1288 a	643 a	964 bc
Reubens	40	4.7	261 fg	1375 c	955 a	479 a	768 c

* Vigor rating 1-9, with 1 best.

+ Means within a column followed by the same letter are not significantly different as determined by an **LSD** test at the 5% level.

On July 17, 1997, seedheads of Reubens and 9054634 were clipped and removed from each plot across all three replications. Seed was then bulk harvested from the remaining eight top performing accessions and re-accessioned as 9078666. A total of 2.508 kilograms of seed was harvested from this four year old stand. This was equivalent to seed production of 140 kg/ha (125 lbs/A).

FIELD TESTING: A limited amount of seed was sent out for testing under actual use field conditions.

Mongolia: 9078666 Canada bluegrass was one of forty five U.S. cultivars and experimental accessions sent to the Research institute of Animal Husbandry-Mongolian Agriculture University, Ulaanbaatar, Mongolia in the spring of 2000. Initial Evaluation Plantings were established at three sites (Turgen, Batsumber, and Buyant) in Mongolia using 1 meter long rows (twenty seeds/row) and replicated three times. First year data indicate that 9078666 emerged on the sites that received supplemental irrigation. Dryland conditions were very severe in

Mongolia during the 2000 growing season resulting in limited emergence of the U.S. cultivars, as well as, the native Mongolian germplasm.

Acid/Heavy Metal Affected Mine Sites: 9018468 Canada bluegrass, the top performer in the Comparative Evaluation Planting at the Bridger PMC, was used in several plantings on acid/heavy metal affected soils in the Anaconda (three sites) and East Helena (1 site) area. These are sites that have been impacted by the smelting of copper and lead. This accession performed well on low and moderately impacted sites, but did not establish in the plots on the pure tailings. Canada bluegrass was evaluated in comparison alpine bluegrass *Poa alpina,* Sandberg bluegrass *Poa secunda,* big bluegrass *Poa ampla*, and Kentucky bluegrass *Poa pratensis.*

Xeriscape Demonstration Planting: A Demonstration Planting was established on 4/10/98 at the Bridger Plant Materials Center on a dryland site (280 mm/11.3 in annual precipitation). Nine species, including 9078666 Canada bluegrass were established in 6 meter X 6 meter plots. The plots were broadcast seeded at a rate of 5380 seeds/M^2 (500 seeds/ft^2) and hand raked to incorporate the seed. The west half of each plot was periodically mowed to simulate a manicured lawn situation, with the east half left standing. With no supplemental water or fertilization the Canada bluegrass established a solid stand, but did not form a tight sod. It is apparent that Canada bluegrass is a feasible alternative to Kentucky bluegrass for a manicured bluegrass under dry, low fertility conditions. In 2001 these plots will be traversed periodically with a vehicle to evaluate the affect of traffic/trampling on both mowed and unmowed conditions.

FOUNDATION SEED INCREASE: On April 14, 1998 a 0.14 hectare (0.35 acre) field was seeded using 0.9 meter row spacing. The first seed crop was harvested July 28, 1999, yielding 185 kg of seed/ha (26.4 kg total seed). The following year seed was harvested on July 31, 2000, yielding 257 kg of seed/ha (36.4 kg total seed). The seed production field was swathed when the seed was at the firm dough stage and allowed to cure in the windrow for 4-6 days before combining. There is a minimal amount of seed shatter, making this species relatively easy to harvest. Germination trials were conducted using a 10 day pre-chill (2° C). This seed had a two week total germination of 97%, with a 94% germination rate in the first 6 days.

USES: Canada bluegrass is considered a pioneer species on low-fertility and medium acidic sites. Its primary use would be ground cover and erosion control on disturbed sites, e.g., roadsides, hardrock mines, damsites, heavy-use recreation areas, wildlife habitat, ski slopes, and low-maintenance landscaping. Canada bluegrass is adapted for use as a forage and grazing species on low-fertility, high elevation sites where common forages would perform poorly. It is relished by all classes of domestic livestock and is readily used by large wildlife ungulates such as elk and deer. It stays green well into fall and early winter and withstands close cropping and heavy trampling.

ENVIRONMENTAL CONSIDERATIONS: This introduced species has naturalized throughout much of northern United States and Southern Canada, being introduced into North America over two hundred years ago. This species is considered a pioneer species on drastically disturbed sites and can encroach on areas that are overgrazed or are subjected to heavy trampling. It is not competitive with good to excellent established vegetation. Based on the Environmental Evaluation (Exhibit 540-31) in the National Plant Materials Manual, Canada bluegrass scores as follows: Impact on Habitats, Ecosystems, and Land Use—(low-15/45), Ease if Management—(low-19/40), Conservation Need and Plant Use (Moderate-6/15), and Biological Characteristics (moderate-40/70).

FOUNDATION SEED: Foundation (G_1) seed is available from the Bridger Plant Materials Center through the Montana Foundation Seed Program at Montana State University, Bozeman, Montana or Wyoming Seed Certification Service, Powell, Wyoming. G_0 seed (breeders), as well as, G_1 seed (Foundation) will be maintained at the Bridger PMC. The Montana and Wyoming Seed Certification Programs will recognize Registered (G_2) and Certified (G_3) classes in the Certified Seed Program.

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